

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

Date of mailing (day/month/year) 19 June 2001 (19.06.01)	
International application No. PCT/GB00/03306	Applicant's or agent's file reference P022706WO
International filing date (day/month/year) 25 August 2000 (25.08.00)	Priority date (day/month/year) 27 August 1999 (27.08.99)
Applicant GAIT, Michael, John et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:21 March 2001 (21.03.01)☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P022706W0</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 03306</b>	International filing date (day/month/year) <b>25/08/2000</b>	(Earliest) Priority Date (day/month/year) <b>27/08/1999</b>
Applicant  <b>MEDICAL RESEARCH COUNCIL</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**METHOD FOR COUPLING MOLECULES**

**5. With regard to the abstract,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figure No.**

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03306

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61K47/48

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EMBASE, BIOSIS, CHEM ABS Data, EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	STETSENKO, DMITRY A. ET AL: "Efficient Conjugation of Peptides to Oligonucleotides by "Native Ligation" J. ORG. CHEM. (2000), 65(16), 4900-4908 , XP000992973 abstract; tables	1-35
P,X	STETSENKO, DMITRY A. ET AL: "New phosphoramidite reagents for the synthesis of oligonucleotides containing a cysteine residue useful in peptide conjugation" NUCLEOSIDES, NUCLEOTIDES NUCLEIC ACIDS (2000), 19(10-12), 1751-1764 , XP002165721 abstract	1-35

☒ Further documents are listed in the continuation of box C.

☐ Patent family members are listed in annex.

\* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&\* document member of the same patent family

Date of the actual completion of the international search

19 June 2001

Date of mailing of the international search report

02/07/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Berte, M

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03306

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ERITJA, RAMON ET AL: "Use of the S-tert-butylsulfenyl group for protection of cystein in solid-phase peptide synthesis using Fmoc amino acids" TETRAHEDRON (1987), 43(12), 2675-80 , XP002165722 abstract ---	1-35
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## INTERNATIONAL SEARCH REPORT

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### 1. Basis of the report

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6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

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International Application No

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- \* & \* document member of the same patent family

Date of the actual completion of the international search

19 June 2001

Date of mailing of the international search report

02/07/2001

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk  
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Fax: (+31-70) 340-3016

Authorized officer

Berte, M

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
8 March 2001 (08.03.2001)

PCT

(10) International Publication Number  
**WO 01/15737 A3**

(51) International Patent Classification<sup>7</sup>: **A61K 47/48**

(21) International Application Number: **PCT/GB00/03306**

(22) International Filing Date: **25 August 2000 (25.08.2000)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
9920397.8 27 August 1999 (27.08.1999) GB  
0012083.2 18 May 2000 (18.05.2000) GB

(71) Applicant (for all designated States except US): **MEDICAL RESEARCH COUNCIL [GB/GB]; 20 Park Crescent, London W1N 4AL (GB).**

(72) Inventors; and

(75) Inventors/Applicants (for US only): **GAIT, Michael, John [GB/GB]; 16 Forest Road, Cambridge CB1 9JB (GB). STETSENKO, Dmitry [RU/GB]; Upper Flat, 25 Fulbourn Road, Cambridge CB1 4JL (GB).**

(74) Agents: **HOWARD, Paul, Nicholas et al.; Carpmals & Ransford, 43 Bloomsbury Square, London WC1A 2RA (GB).**

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

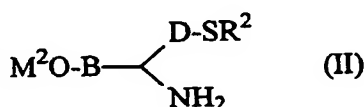
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:  
— with international search report

(88) Date of publication of the international search report:  
15 November 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **METHOD FOR COUPLING MOLECULES**



(57) Abstract: A method of linking a first molecule  $\text{M}^1\text{-NH}_2$  with a second molecule  $\text{M}^2\text{-OH}$  comprising reaction of a compound of the formula (I):  $\text{M}^1\text{-NH-CO-A-CO-SR}^1$  wherein  $\text{M}^1$  is the residue of a molecule bearing an amino group, A is an alkylene or arylene group,  $\text{R}^1$  is alkyl or aryl, with a compound of formula (II),  $\text{M}^2$  is the residue of a molecule bearing a hydroxy group wherein B is a linker, D is  $\text{C}_{1-4}$  alkylene group or  $\text{C}_{3-12}$  arylene group,  $\text{R}^2$  is hydrogen or a thiol protecting group. In addition, this invention relates to conjugate products of the coupling reaction, reagents for modifying  $\text{M}^1\text{-NH}_2$  and  $\text{M}^2\text{-OH}$ , and kits comprising these reagents.

WO 01/15737 A3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03306

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61K47/48

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EMBASE, BIOSIS, CHEM ABS Data, EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*8\* document member of the same patent family

Date of the actual completion of the international search

19 June 2001

Date of mailing of the international search report

02/07/2001

Name and mailing address of the ISA

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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Berte, M

# INTERNATIONAL SEARCH REPORT

International Application No

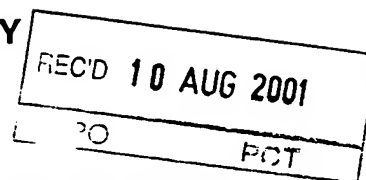
PCT/GB 00/03306

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>ERITJA, RAMON ET AL: "Use of the S-tert-butylsulfenyl group for protection of cystein in solid-phase peptide synthesis using Fmoc amino acids"</p> <p>TETRAHEDRON (1987), 43(12), 2675-80 , XP002165722</p> <p>abstract</p>	1-35
Y	<p>T. M. HACKENG ET AL.: "Protein synthesis by native chemical ligation: Expanded scope by using straightforward methodology"</p> <p>PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, vol. 96, August 1999 (1999-08), pages 10068-10073, XP002165723</p> <p>WASHINGTON US</p> <p>cited in the application</p> <p>figure 1</p>	1-35

## PATENT COOPERATION TREATY

## PCT



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PO22706WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/03306	International filing date (day/month/year) 25/08/2000	Priority date (day/month/year) 27/08/1999
International Patent Classification (IPC) or national classification and IPC A61K47/48		
Applicant MEDICAL RESEARCH COUNCIL et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☒ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 21/03/2001	Date of completion of this report 08.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer G. Willière Telephone No. +49 89 2399 8548 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03306

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):  
**Description, pages:**

1-32 as originally filed

### **Claims, No.:**

1-35 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03306

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## II. Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed.
  - ☐ translation of the earlier application whose priority has been claimed.
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid.

Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:  
**see separate sheet**

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes:	Claims	1-35
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-35
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-35
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**Re Item II**

**Priority**

All the claimed subject-matter is entitled to the priority. The documents cited under the P,X category do thus not belong to the prior art according to Rule 64.1 PCT.

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: T. M. HACKENG ET AL.: 'Protein synthesis by native chemical ligation: Expanded scope by using straightforward methodology' PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, vol. 96, August 1999 (1999-08), pages 10068-10073, WASHINGTON US **cited in the application.**

2. D1 (closest prior art) refers to native chemical ligation of peptide fragments, wherein a first fragment containing specific (MPAL, see figure 1, part A) C-terminal thioester peptide to a peptide having different N-terminal amino acids. This method was found less applicable with Val, Ileu and Pro due to slow ligation rates.

The presently claimed method inter alia differs from the D1 teaching in that the thioester group of the N-terminal thioester is spaced away from the terminal amino acid. The claimed subject-matter is thus novel (article 33(2) PCT). This solves the problem of slow ligation rates as disclosed in D1 for sterically hindered amino acids (such as Val, Ileu and Pro, see above). Since D1 does not suggest said solution, the subject-matter of the present claims is believed to involve an inventive step (article 33(3) PCT).